Title: Entrainment and mixing in turbulent buoyant jets

Analytical solutions of fully developed, Boussinesq, round and plane vertical buoyant jets (forced plumes) that discharge into an infinite, homogeneous, motionless ambient fluid, can be derived from the momentum conservation equation using a characteristic buoyant jet width parameter C_p, and verified by experiments.

The entrainment coefficient expressed as a function of C_p and the local Richardson number, may take values that are lower than the entrainment coefficient of pure, momentum jets, when the buoyancy acts against the motion (the flow is negatively buoyant). Application of the entrainment coefficient as a function of the local Richardson number to various cases of positively as well as in negatively buoyant jets (fountains), has produced results that are congruent to experiments.